Application No.: 10/694,310
Reply to Office Action of April 14, 2005

REMARKS/ARGUMENTS

The above-identified patent application has been amended and reconsideration and re-examination are hereby requested.

The specification and Abstract have been amended to correct an error and thereby reflect the material described in the detailed description and drawings of the patent application. More particularly, as pointed out from FIG. 4, the UEGO2, which is downstream of the particulate filter, is controlled to UEGO2_DES by changing an engine operating parameter and the process changes UEGO2_DES as a function of UEGO3 which is after the lean NOx trap. As pointed out on page 10 beginning at line 26:

> Thus, the process, in Step 412, sets UEGO2 lean setpoint; i.e., a predetermined level of oxygen concentration, UEGO2, is established. More particularly, UEGO2_DES = UEGO2_DES_LEAN, where UEGO2_DES_LEAN is established for a particular engine type *a priori*.
>
> In Step 413, a determination is made as to whether the oxygen concentrations, i.e., air fuel ratio, sensed by UEGO sensor 35 (i.e., UEGO2) is less than UEGO2_DES. If it is, the oxygen concentration as sensed by UEGO sensor 33 (i.e., UEGO1) is increased reduced by the means set forth in the above-referenced patent application. For example, the increase in oxygen concentration is produced by engine measures (e.g. increase O2 level in feed gas, for example by means of a PI controller, as described in the above referenced patent application, Step 415. On the other hand, if UEGO2 > UEGO2_DES, the oxygen concentration as sensed by UEGO sensor 33 (i.e., UEGO)1 is decreased by such engine measures, Step 416. Thus, Steps 413, 415 and 416 adjust the oxygen concentration as sensed by UEGO sensor 33 (i.e., UEGO1) of the gases into the DPF 26 in accordance with the oxygen concentration of the gases exiting the DPF, such exiting oxygen concentration being sensed by UEGO sensor 35 (i.e., UEGO2) relative to setpoint UEGO2_DES_LEAN.

Thus, as described in connection with FIG. 4, the method includes adjusting at least one engine operating parameter to maintain a desired air fuel ratio for gases exiting the particulate filter in accordance with a difference between a reference set point air fuel ratio level and the air fuel ratio of gases exiting the particulate filter. The reference set point level is changed between a rich air fuel ratio and a lean air fuel ratio as a function of the air fuel ratio of the gases exiting the lean NOx trap.

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The claims referenced to above have been renumbered as indicated by the Examiner. Claim 11 has been amended to depend on claim 10.

Referring to the claims, claim 1 points out that the method includes:

> providing a first oxygen sensor upstream of the particulate filter;
> providing a second oxygen sensor at a position downstream of the particulate filter and upstream of the trap; and
> controlling the particulate filter regeneration rate and NOx trap desufation in response to both the metered oxygen flow of gases entering the particulate filter using the first oxygen sensor and oxygen content of gases entering the lean NOx trap using the second oxygen sensor.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia*, controlling the particulate filter regeneration rate and NOx trap desufation in response to the ***both*** the metered oxygen flow of gases entering the particulate filter ***using the first oxygen sensor*** (upstream of the particulate filter) ***and oxygen content of gases entering the lean NOx trap using the second oxygen sensor*** (at a position downstream of the particulate filter and upstream of the trap) as set forth in claim 1.

Claim 3 points out that the method includes:

> providing a first oxygen sensor upstream of the particulate filter;
> providing a second oxygen sensor at a position downstream of the particulate filter and upstream of the trap; and
> adjusting, in response to the first and second oxygen sensors, at least one engine operating parameter to maintain a desired air fuel ratio for gases exiting the particulate filter in accordance with a difference between a reference set point air fuel ratio level and the air fuel ratio of gases exiting the particulate filter and wherein the reference set point level is changed between a rich air fuel ratio and a lean air fuel ratio as a function of the air fuel ratio of the gases exiting the lean NOx trap.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* adjusting, in response to ***the first and second oxygen sensors,*** at least one engine operating parameter to maintain a desired air fuel ratio for gases exiting the particulate filter in accordance with a

difference between a reference set point air fuel ratio level and the air fuel ratio of gases exiting the particulate filter and wherein the reference set point level is changed between a rich air fuel ratio and a lean air fuel ratio as a function of the air fuel ratio of the gases exiting the lean NOx trap as in claim 3.

Claim 4 has been re-written in independent form and changed to the claim so that it is in accordance with the detailed description as described above .

Claim 5 points out that the method includes:

providing a first oxygen sensor upstream of the particulate filter;
providing a second oxygen sensor at a position downstream of the particulate filter and upstream of the trap;
controlling, in response to the first and second oxygen sensors, the oxygen concentration of the gas exiting the lean NOx trap by commanding an oxygen concentration setpoint for the gas entering the NOx trap, such commanded oxygen concentration being controlled by commanding an oxygen concentration setpoint for the gas entering the particulate filter.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* controlling, ***in response to the first and second oxygen sensors,*** the oxygen concentration of the gas exiting the NOx trap by commanding an oxygen concentration setpoint for the gas entering the NOx trap, such commanded oxygen concentration being controlled by commanding an oxygen concentration setpoint for the gas entering the particulate filter, as in claim 5.

Claim 6 points out that the method includes:

providing a first oxygen sensor upstream of the particulate filter and using a signal produced by such sensor to control the particulate filter regeneration rate by metering the oxygen flow sensed by sensor and;
providing a second oxygen sensor at a position downstream of the particulate filter and upstream of the lean NOx trap and using a signal

produced by such second sensor to control the oxygen content of the gas entering the lean NOx trap.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* providing a first oxygen sensor upstream of the particulate filter and using a signal produced by such sensor to control the particulate filter regeneration rate by metering the oxygen flow sensed by sensor and; providing a second oxygen sensor at a position downstream of the particulate filter and upstream of the lean NOx trap and using a signal produced by such second sensor to control the oxygen content of the gas entering the lean NOx trap, as in claim 6.

Claim 7 points out that the method includes:

providing a first oxygen sensor upstream of the particulate filter;
providing a second oxygen sensor at a position downstream of the particulate filter and upstream of the trap; and
adjusting, in response to the first and second sensors, the oxygen level into the particulate filter, comprising:
reducing the oxygen content of the gas entering the particulate filter if the oxygen concentration measured by downstream oxygen sensor is greater than a predetermined level, such latter oxygen content being measured by the upstream oxygen sensor;
increasing the oxygen content of the gas entering the particulate filter if the oxygen concentration measured by downstream oxygen sensor is less than the predetermined level, such latter oxygen content being measured by the upstream oxygen sensor.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia*, providing a ***first oxygen sensor upstream of the particulate filter***; providing ***a second oxygen sensor at a position downstream of the particulate filter and upstream of the trap***; and ***adjusting, in response to the first and second sensors, the oxygen level into the particulate filter,*** comprising: reducing the oxygen content of the gas entering the particulate filter if the oxygen concentration measured by downstream oxygen sensor is greater than a predetermined level, such latter oxygen content being measured by the

upstream oxygen sensor; increasing the oxygen content of the gas entering the particulate filter if the oxygen concentration measured by downstream oxygen sensor is less than the predetermined level, such latter oxygen content being measured by the upstream oxygen sensor, as in claim 7.

Claim 10 points out that the system includes a processor for simultaneously controlling the particulate filter regeneration rate and NOx trap desufation in response to the both the metered oxygen flow of gases entering the particulate filter ***using the first oxygen sensor and oxygen content of gases entering the lean NOx trap using the second oxygen sensor.***

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia*, a processor for simultaneously controlling the particulate filter regeneration rate and NOx trap desufation in response to the both the metered oxygen flow of gases entering the particulate filter ***using the first oxygen sensor and oxygen content of gases entering the lean NOx trap using the second oxygen sensor,*** as in claim 10.

Claim 12 points out that the system includes

> a first oxygen sensor disposed upstream of the filter;
> a second oxygen sensor positioned downstream of the particulate filter and downstream of the lean NOx trap; and
> a processor, responsive to the first and second oxygen sensors, for simultaneously producing regeneration in the particulate filter and producing desulfating in the lean NOx trap by adjusting at least one engine operating parameter to maintain a desired air fuel ratio for gases exiting the particulate filter in accordance with a difference between a reference set point air fuel ratio level and the air fuel ratio of gases exiting the particulate filter to simultaneously produce regeneration in the particulate filter and to produce for desulfating in the lean NOx trap, and wherein the reference set point level is changed between a rich air fuel ratio and a lean air fuel ratio as a function of the air fuel ratio of the gas exiting the lean NOx trap.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* a processor, ***responsive to the first and second oxygen sensors***, for simultaneously producing regeneration in the particulate filter and producing desulfating in the lean NOx trap by adjusting at least one engine operating parameter to maintain a desired air fuel ratio for

gases exiting the particulate filter in accordance with a difference between a reference set point air fuel ratio level and the air fuel ratio of gases exiting the particulate filter to simultaneously produce regeneration in the particulate filter and to produce for desulfating in the lean NOx trap, and wherein the reference set point level is changed between a rich air fuel ratio and a lean air fuel ratio as a function of the air fuel ratio of the exiting the lean NOx trap, as in claim 12.

Claim 13 has been re-written in independent form and changed to the claim so that it is in accordance with the detailed description as described above.

Claim 14 points out that the system includes:

> a first oxygen sensor disposed upstream of the filter;
> a second oxygen sensor positioned downstream of the particulate filter and downstream of the lean NOx trap; and
> a processor, responsive to the first and second oxygen sensors, for producing signals to simultaneously regenerate the particulate filter and to desulfate the lean NOx trap by controlling the oxygen concentration of the gas exiting the particulate filter by commanding an oxygen concentration setpoint for the gas entering the particulate filter, such commanded oxygen concentration being controlled by commanding an oxygen concentration setpoint for the gas entering the particulate filter.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* a processor, responsive to ***the first and second oxygen sensors***, for producing signals to simultaneously regenerate the particulate filter and to desulfate the lean NOx by controlling the oxygen concentration of the gas exiting the particulate filter by commanding an oxygen concentration setpoint for the gas entering the particulate filter, such commanded oxygen concentration being controlled by commanding an oxygen concentration setpoint for the gas entering the particulate filter, as in claim 14.

Claim 15 points out that the processor simultaneously regenerates the particulate filter and for desulfating the lean NOx trap, comprising:

providing a first oxygen sensor upstream of the particulate filter and using a signal produced by such sensor to control the particulate filter regeneration rate by metering the oxygen flow sensed by sensor and;

providing a second oxygen sensor positioned downstream of the particulate filter and upstream of the lean NOx trap and using a signal produced by such second sensor to control the oxygen content of the gas entering the lean NOx trap.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* providing a ***first oxygen sensor upstream of the particulate filter*** and using a signal produced by such sensor to control the particulate filter regeneration rate by metering the oxygen flow sensed by sensor and; providing ***a second oxygen sensor positioned downstream of the particulate filter and upstream of the lean NOx trap*** and using a signal produced by such second sensor to control the oxygen content of the gas entering the lean NOx trap, as in claim 15.

Claim 16 points out that the system includes:

a first oxygen sensor disposed upstream of the filter;

a second oxygen sensor positioned downstream of the particulate filter and downstream of the lean NOx trap; and

a processor, responsive to the first and second sensors, for simultaneously regenerating the particulate and for desulfating the lean NOx trap, comprising:

adjusting the oxygen level into the particulate filter, comprising:

reducing the oxygen content of the gas entering the particulate filter if the oxygen concentration measured by downstream oxygen sensor is greater than a predetermined level, such latter oxygen content being measured by the upstream oxygen sensor;

increasing the oxygen content of the gas entering the particulate filter if the oxygen concentration measured by downstream oxygen sensor is less than the predetermined level, such latter oxygen content being measured by the upstream oxygen sensor.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia,* a first oxygen sensor disposed upstream of the filter; a second oxygen sensor

positioned downstream of the particulate filter and downstream of the lean NOx trap; and a processor, responsive to the first and second sensors, for simultaneously regenerating the particulate and for desulfating the lean NOx trap, as in claim 16.

Claim 19 points out that the medium includes:

> code for adjusting at least one engine operating parameter in response to a first oxygen sensor upstream of the particulate filter and a second oxygen sensor positioned downstream of the particulate filter and upstream of the trap to maintain a desired air fuel ratio for gases exiting the particulate filter in accordance with a difference between a reference set point air fuel ratio level and the air fuel ratio of gases exiting the particulate filter and wherein the reference set point level is changed between a rich air fuel ratio and a lean air fuel ratio as a function of the air fuel ratio of the exiting the lean NOx trap.

It is respectfully submitted that Laroo (U. S. Patent No. 6,779,339) does not describe, *inter alia*, code for adjusting at least one engine operating parameter in response to a first oxygen sensor upstream of the particulate filter and a second oxygen sensor positioned downstream of the particulate filter and upstream of the trap.

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In the event a petition for extension of time is required by this paper and not otherwise provided, such petition is hereby made and authorization is provided herewith to charge deposit account No. 06-1510 for the cost of such extension. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505.

In the event any additional fee is required, please charge such amount to Patent and Trademark Office Deposit Account No. 06-1510. If there are insufficient funds in this account, please charge the fees to Deposit Account No. 06-1505.

Respectfully submitted,

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Date

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